

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)	
)	
Facilitating Opportunities for Flexible,)	ET Docket No. 03-108
Efficient, and Reliable Spectrum Use)	
Employing Cognitive Radio Technologies)	
)	
)	

To: The Commission

Comments of the Society of Broadcast Engineers, Inc.

The Society of Broadcast Engineers, Incorporated (SBE), the national association of broadcast engineers and technical communications professionals, with more than 5,000 members world wide, hereby respectfully submits its comments in the above-captioned notice of proposed rulemaking (NPRM) relating to "smart," or cognitive radios, and to software defined radios.

I. Proposal Would Cause Increased Interference to TV BAS Operations on Channels A8 and A9

1. This rulemaking proposes to allow a six-fold (7.8 dB) increase in the transmitter power output (TPO) and equivalent isotropic radiated power (EIRP) for 2.4 GHz Part 15 spread-spectrum devices, also know as wireless local area networks (WLANs) or IEEE 802.11b devices. The allowable TPO would be increased from 1 watt to 6 watts, and the allowable EIRP would be increased from 4 watts (36 dBm) to 24 watts (43.8 dBm), if the Part 15 device is being operated in a "rural area." SBE opposes this relaxation of the Part 15 rules because it believes that it would be impractical and unworkable to confine higher power 2.4 GHz Part 15 devices to "rural areas," and that increased interference to TV broadcast auxiliary service (BAS) operations on Channels A8 (2,450–2,467 MHz) and A9 (2,467–2,483.5 MHz) would inevitably result.

2. Existing 1-watt TPO/4-watt EIRP Section 15.247 2.4 GHz Part 15 devices are already causing chronic interference to TV BAS operations on Channel A8 and A9. For example, at the recent April 20, 2004, meeting of the 2 GHz *ad hoc* Committee at the Broadcast Engineering Conference (BEC) at the National Association of Broadcasters (NAB) convention in Las Vegas, the BAS frequency coordinator for the Phoenix, Arizona, market explained that Phoenix has four

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major electronic news gathering (ENG) receive sites, Shaw Butte, South Mountain, Usuary Pass and White Tanks. These four ENG receive only (ENG RO) sites are north, south, east, and west of Phoenix, as shown by the attached Figure 1. The Phoenix coordinator explained that about every six months or so one of these four sites becomes unusable for Channel A8 and A9 operations because of the proliferation of 2.4 GHz WLANs at the ENG-RO site. Of course, as a Part 15 device, WLANs are not permitted to cause interference to licensed TV BAS operations. To cure the problem, the ENG-RO site is visited, and the operators of the offending Part 15 devices are instructed to cease and desist their interference-causing operations. The Phoenix coordinator provided the analogy that these visits are like turning on the light in a cockroach-infested room: The 2.4 GHz Part 15 "cockroaches" scurry to get out of the light. But they inevitably come back, over time, and the process has to be repeated. SBE does not want to see this problem aggravated by having to overcome WLANs that are now 8 dB more powerful.

3. SBE believes that allowing higher power 2.4 GHz Part 15 WLAN devices to be marketed in the United States would inevitably result in their use in non "remote areas," either because the "remote area" boundary has failed to keep up with population growth, or due to intentional subterfuge by the sellers and/or users of such higher-power devices. For example, SBE can envision the sale of higher-power 2.4 GHz Part 15 devices, illegally modified to convince the device that it is in a "remote area," to consumers (perhaps even un-suspecting consumers) who then use the device, without realizing that its use is illegal and that interference to licensed 2.5 GHz TV BAS operations is being caused.

4. With regard to the plan to establish boundaries defining "remote areas," and then requiring higher-power Part 15 devices to integrally employ a global positioning system (GPS) receiver to determine if the device is in a "remote area," SBE believes that such an approach would be impractical and unworkable, for several reasons:

4a. First, a Part 15 device, by its very nature, is intended to be mass produced and must therefore be a relatively low-cost device; requiring an internal GPS receiver is at odds with this fundamental requirement.

4b. Second, there would be a strong incentive for the manufacturer of the higher-power 2.4 GHz WLAN to make the no-higher-power-operation-in-non-remote-areas lockout easily defeated by the end user. And even if a manufacturer's best efforts were used, SBE fears that enterprising and technically adept technophiles would nevertheless find a way to defeat it. If anyone doubts this can happen, all one has to do is look at the numerous "hacks" posted to

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websites for scanners, cable and satellite converters, and other electronic devices with built-in legal constraints.

4c: Third, any FCC database of "remote areas" would quickly become obsolete. SBE has concerns that the FCC may not have the resources to maintain a "remote area" database; for example, the OET web site still has maps showing Private Operational Fixed Service (POFS) "frequency-congested areas" dating from 1983, which, to the best of SBE's knowledge, have never been updated, even though the June 22, 1983, Public Notice¹ establishing the POFS frequency congested areas promised that "a revised list will be published as soon as an analysis of the current data base is completed."² And, what about Part 15 equipment that has already been shipped? How would updates to a database of "remote areas" be conveyed to such already in-the-field hardware?

4d: Fourth, using a geographic boundary is a questionable and secondary metric for determining whether spectrum congestion in a particular band exists, and completely ignores the time variability factor. That is, a given area may become "frequency congested" due to a scheduled event, or due to a breaking news story. But, if the higher-power Part 15 "Pandora's Box" has already been unwisely and imprudently opened, it will be too late to limit the increased interference that a new generation of 8 dB higher power Part 15 devices would inevitably cause to 2.5 GHz TV BAS operations.

4e. Fifth, gain antennas already widely available in retail computer stores would invariably be integrated with, or be connected to, these higher power devices. Antenna gains of 10 to 20 dBi are commonly quoted. Readily available online literature makes promises of communication distances of "up to 20 miles" with the existing (1-watt TPO) power limit.³

4f. Sixth, SBE invites the Commission to do its own Google search for "wi-fi interference." That search will return literally dozens of recent articles about interference involving 2.4 GHz

¹ "Private Microwave Congested Areas," FCC Public Notice 4884. According to the Notice, the establishing of POFS frequency congested areas, used to determine whether more directive Category A transmitting antenna must be used, was based on 1979 data.

² See <http://www.fcc.gov/oet/info/maps/microwav/>.

³ For example, see www.otcwireless.com/specs/AVCW-G-AP_Data_Sheet.pdf: "Designed for indoor and outdoor uses, this 802.11g, 54 Mbps high-speed wireless access point meets the challenges of many of today's demanding applications. The AVCW-G-AP offers the user a choice of 9 dBi or 15 dBi integrated directional antenna, or an integrated RF connector for a wide selection of external antennae. The flexibility of using different antennae allows the AVCW-G-AP to provide optimal link distance up to 20 miles for both indoor and outdoor applications."

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Part 15 devices. Part 15 2.4 GHz devices are clearly near the breaking point. Allowing an 8 dB power increase would be guaranteed to be the straw that breaks the camel's back.

II. NPRM Overlooks Grandfathered TV BAS Operations on Channel A10

5. The NPRM also proposes to allow the marketing of broader frequency range Part 15 devices, that could transmit between 2,400 MHz and 2,500 MHz, and not just 2,400 MHz and 2,483.5 MHz, on the basis that some other countries allow Part 15 devices to use 2,483.5–2,500 MHz. Since 2,483.5–2,500 MHz is not available for Part 15 use in the U.S., Part 15 devices capable of transmitting on 2,483.5–2,500 MHz cannot presently be imported or marketed in the U.S. However, the NPRM proposes that if the Part 15 device was "smart," or "cognitive," and had the ability to distinguish whether it was in the U.S., or in some other country, were operation on 2,483.5–2,500 MHz was permissible, the importation and marketing of 2,400–2,500 MHz Part 15 devices would then be permissible.

6. The NPRM correctly notes that in the U.S., 2,483.5–2,500 MHz is assigned to the mobile satellite service (MSS); indeed, the February 10, 2003, IB Docket 01-185 report and order (R&O) assigned this spectrum for MSS ancillary terrestrial component (ATC) base stations. However, this instant ET 03-108 NPRM suffers from the same flaw as the IB 01-185 rulemaking: It overlooks grandfathered TV BAS operations on Channel A10 (2,483.5–2,500 MHz).

7. As was documented in the April 4, 2003, SBE Petition for Reconsideration of the IB 01-185 R&O, and as was re-affirmed and further documented in the March 30, 2004, SBE Reply to the Globalstar Opposition to the SBE Petition for Reconsideration to the IB 01-185 R&O, grandfathered TV BAS operations on Channel A10 play an important "safety valve" role for 2.5 GHz TV BAS operations by providing a *de facto* three-channel capability. The ability of grandfathered TV BAS stations to continue to operate on Channel A10 is all the more important because Channel A10 is not "contaminated" by interference from Part 15 devices and from Part 18 Industrial, Scientific and Medical (ISM) devices. Further, unlike TV BAS Channels A8 and A9, grandfathered Channel A10 is not shared with POFS stations (*e.g.*, police use of Channels A8 and A9 for surveillance and tactical video downlinks (TVDL) from police helicopters).

8. SBE submits that such a relaxation of the importation and marketing of Part 15 devices would be unwise and unworkable. As would be the case for allowing higher-power 2.4 GHz Part 15 devices, the need for the device to be able to determine what country it was located in would likely increase the cost of the device beyond that practical for a mass-produced, low-cost Part 15

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device, and there would again be a strong incentive to defeat the 2,483.5–2,500 MHz frequency lock out. SBE submits that the only reliable method of not extending the contamination of the 2,450–2,483.5 MHz TV BAS band to the 2,483.5–2,500 MHz portion of the "grandfathered" TV BAS band is to not allow the importation or marketing of Part 15 devices capable of transmitting at 2,483.5–2,500 MHz to start with.

III. SBE Does Not Oppose Cognitive Radios *Per Se*

9. SBE is not opposed to the concept of cognitive radios. Indeed, SBE anticipates that radios implementing the recently approved data return link (DRL) channels for the re-farmed 2,025–2,110 MHz TV BAS will be "smart," or cognitive radios. However, what SBE sees as reasonable for radios intended for commercial applications by licensed stations is much different than what SBE sees as prudent or practical for low-cost, mass produced Part 15 systems. The Commission must realize that once Part 15 devices are sold and marketed, there is no going back. For better or worse, those Part 15 devices will be used, and there is a long history of Part 15 devices be used or modified in ways not intended or authorized by the Commission. It is the users of licensed stations, sharing spectrum with Part 15 devices, that then have to pay the price. SBE therefore implores the Commission to not be naive and to be very careful how widely it opens the Part 15 "Pandora's Box."

IV. Summary

10. SBE opposes allowing a six-fold increase in the allowable power for 2.4 GHz Part 15 devices, which are already causing chronic interference to licensed TV BAS operations on Channel A8 and A9. SBE opposes allowing the importation or marketing of Part 15 WLAN devices that are capable of transmitting at 2,483.5-2,500 MHz (grandfathered TV BAS Channel A10).

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List of Figures

11. The following figures or exhibits have been prepared as a part of these ET Docket 03-108 comments:

1. Map showing the four major Phoenix ENG-RO sites.

Respectfully submitted,

Society of Broadcast Engineers, Inc.

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May 3, 2004

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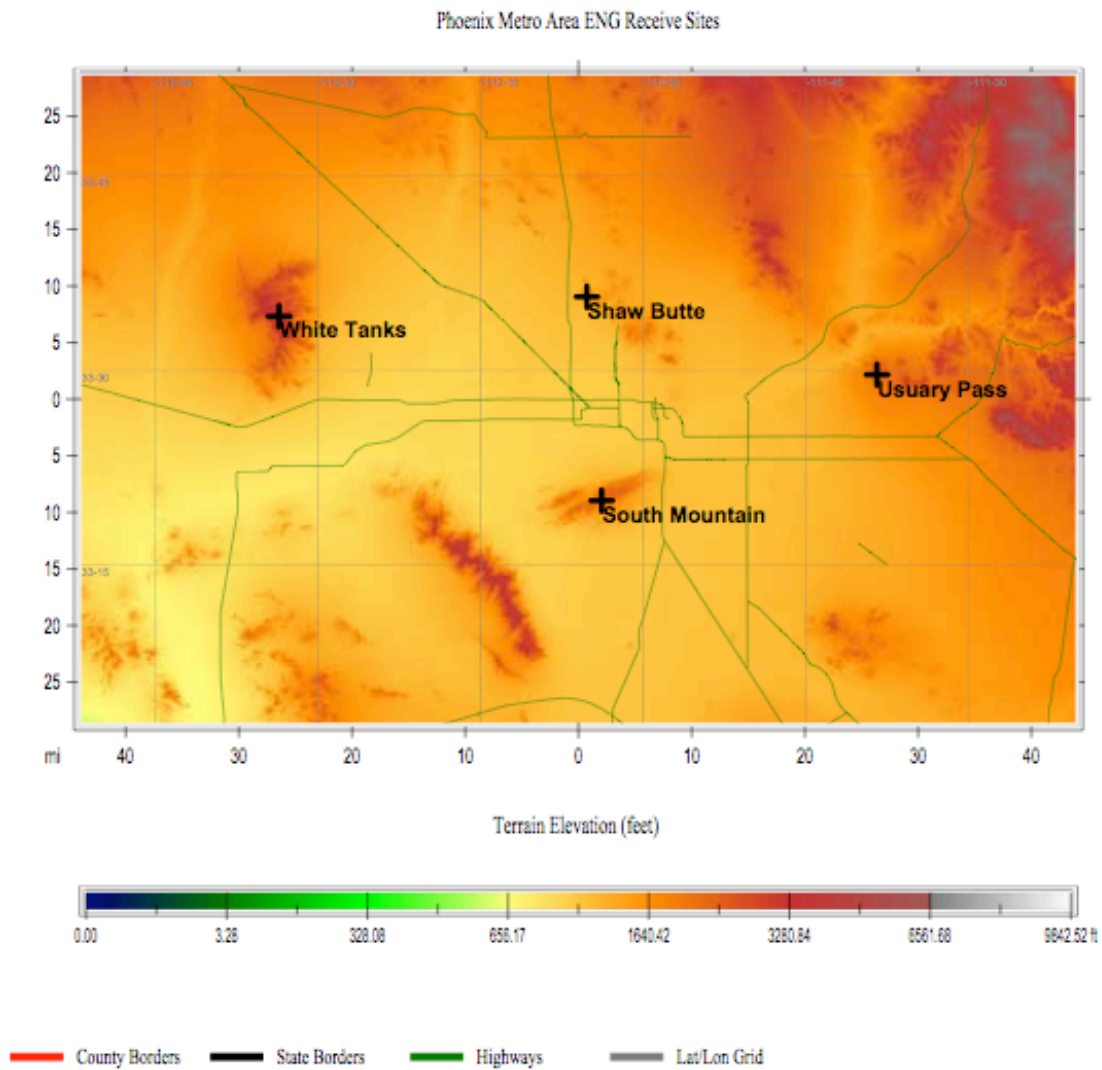
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Phoenix Area ENG Receive Only Sites

ComStudy

Phoenix ENG sites.rs2

Tuesday, April 27, 2004



33-27-55.1 N 111-59-29.1 W 6.28 mi 88.9° Elev: 1164.7 Residen



SOCIETY OF BROADCAST ENGINEERS, INC.
Indianapolis, Indiana

040424.0
Figure 1